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OF INTEREST TO TEACHERS

SECONDARY SCHOOL AGRICULTURE

The March number of *School Science and Mathematics* has an article by D. O. Barto on problems in secondary school agriculture which is interesting to teachers of nature study in the grades and to teachers in the high school. The lack of success in the grades is explained as follows:

" It must not be forgotten that agriculture is largely a science study. It requires some knowledge of the principles of many sciences, and the ability and interest to apply them intelligently. These conditions of scholarship can be expected only in pupils of a certain breadth and maturity of development and comprehension seldom found in the elementary grades.

" A pupil can make little headway in the study of agriculture unless he knows something of physiography, geology, botany, zoölogy, physics and chemistry. It is not a question of whether he has studied these sciences before he takes up agriculture whether he pursues them as separate subjects or learns them as he studies agriculture. The important thing is that some knowledge of these other subjects is indispensable to any serious and effective work in the study of agriculture, and this is a qualification that can hardly be expected to be attained in the elementary grades.

" There is much valuable work that is scientific and agricultural that may be done — should be done — in the elementary grades when we have teachers prepared for it. But agriculture is an applied science. It has won its way only by demonstrating to the farmer that it could be made of practical service to him. As a school study its value and usefulness will largely depend upon the results that can be obtained from the application of principles of science, and this work will demand a sustained interest that young children cannot furnish."

With regard to the conditions in the secondary schools much of the above is true, especially where the work is placed in the lower high school years. Mr. Barto, however, gives in this article some encouraging results of work being done in Illinois.

A key to the common winter trees about Milwaukee which is not so local as the title indicates appears in the April *School Science and Mathematics.* The author, I. N. Mitchell, has made the key simple enough for high school pupils.

Dr. John M. Coulter has an article on teaching botany in the April *School Science and Mathematics* in which the current conditions are discussed under the headings of the prepared teacher, economic botany, biological grouping, and the point of interest.

The April *Journal of the New York Botanical Garden* contains three illustrated articles which will prove interesting to the general reader: one on the fern collections of the Garden by Ralph C. Benedict, another on East Indian economic plants written by Percy Wilson, and an account of some experiments on the effect of the soil of the Garden hemlock grove upon seedlings by Winifred J. Robinson.

Viewing the government as a teacher, Mr. L. B. Stowe, in the *Outlook* for April 17, enumerates the scientific principles demonstrated within the past few years, and gives interesting concrete illustrations. Those of special interest to us are connected with forest and staple crop protection and with improved methods of farming, such as following the contours of the hill in plowing a hillside instead of plowing straight across the slope.

The April *Plant World* contains two papers which were read at the Baltimore meeting of the American Association for the Advancement of Science: one on overlapping habitats as observed in Mexico by Francis E. Lloyd; and another by W. M. Crocker and L. I. Knight on the effect of illuminating gas upon the flowers of both cut and growing carnations, and the losses sustained by florists through defective pipes, even where chemical tests failed to reveal the presence of gas.

The University of Colorado has recently issued a botanical number as the first number of its sixth volume of studies. The magazine, which should prove interesting to all botanical students in that region, is illustrated, and contains papers by the members of the biological staff on the "botanical opportunity in Colorado", on the mesa and foothill vegetation, especially with relation to physiography and climate, with the distribution of conifers and deciduous trees, and a bibliography and history of Colorado botany.

Dr. O. F. Cook in discussing the history of the cocoanut palm says: "It has long been thought that the cocoanut palm presents a perfect example of adaptation to a littoral environment, but this idea is delusive. The tough outer rind which is popularly supposed to have been developed as a protection against sea water is really to guard the cocoanut when it falls, and give it favorable conditions for germination. Cocoanuts require a certain amount of salt in the soil, but this condition is satisfied by soils in some interior localities as well as on the seacoast. Considerable sunshine is also needed. This, however, is met better in arid regions than by a coastal habitat and the care with which the milk is protected would argue in the same direction. Far from being a wild plant the cocoanut does not appear to thrive long away from human beings and in spite of the supposed diffusion of the tree by oceanic currents no instance of the kind is known."

A freak dandelion, *Taraxacum taraxacum* (L.) Karst., is described by M. P. Somes in the April *American Botanist:*

"In place of the scape which all self-respecting dandelions rear aloft, this 'freak' had a stem, amply provided with leaves — not in whorls, if you please, but alternate. The tip of the flower stalk was bifurcate and bore two heads, rather smaller than the average but perfect in other respects. Near the base of the stem to still further emphasize the abnormality was an auxiliary peduncle tipped by an immature head. There were several plants with this leafy stem habit and all very similar in the forked flower stalk. The soil was an ordinary black earth quite moist but in no way noticeably peculiar and six feet away in the same soil were normal plants of the same species. A friend, who is somewhat severe in his strictures regarding the activity of taxonomists and the resulting multiplicity of synonyms, suggests that I describe this form as a new species and call it *T. paradoxa.* However it may be of interest to some to know that *Taraxacum taraxacum* (L.) Karst. (*T. officinale* Weber, *T. dens-leonis* Desv. etc., etc.) does not always have a scape nor is its inflorescence always a single head."

The April *Bulletin of the Torrey Botanical Club* contains a very interesting article by George E. Stone on the power of growth of ostrich ferns (*Onoclea Struthiopteris* Hoffm.). Young fronds which forced their way through a concrete (rolled tar and gravel) border, about three inches thick, and so hard that a "heavy stroke from a sledge-hammer makes little or no impression upon it," initiated some experiments to show the great force exerted by the young ferns. A lever, weights, and a round piece of wood "of the same dimensions as the undeveloped cluster of fern fronds" constituted the apparatus. The pressure required to break through the concrete in ten to fifteen days, the time usually required by the ferns was 264 pounds in 10 days and 189 pounds in 13 days, Mr. Stone estimates that the work actually accomplished by the ferns is at least 35 atmospheres, and refers to Pfeffer's corn root record of 24 atmospheres, and Clark's squash experiment where a squash developed under a weight of 5,000 pounds, but which, however, represented a cell pressure of but 2–3 atmospheres.

The report of the American Chemical Society, made by the committee appointed to coöperate with the National Conservation Committee, contains some facts of botanical interest, as shown by the following extracts: "In forestry also, the influence of the chemist is distinctly felt. The sprays, used for destroying noxious insects, are chemical preparations. The manufacture of wood alcohol is a chemical process, which may be either wasteful or economical. Turpentine is now produced wastefully, but the waste can be diminished by careful refining, and furthermore, the chemist can aid in discovering substitutes for it. Substitutes for tan bark are also to be sought for by means of chemical investigations. Another distinctly chemical operation is the preparation of wood pulp for paper making, a process which is now wasteful in the highest degree. It is estimated that for every ton of pulp now made by the sulphite process more than a ton of waste material is allowed to drain away into our streams. How to make this material useful is a chemical problem, and so also, in great part, is the investigation of other, now useless fibers, which may replace the more valuable wood. The preservation of wood from decay is still another art in which chemistry is predominant.

" In preserving the fertility of our land, chemistry has an important part to play. Our knowledge of fertilizers, of the food on which crops can thrive, is entirely chemical so far as accuracy is concerned, and must be applied in accordance with chemical principles. A fertilizer which is useless, and therefore wasted on one soil, may be needed on another. Certain fertilizers, like the Stassfurt salts, Peruvian guano, the Chilean nitrates, and phosphate rock are limited in quantity, and their future exhaustion must be considered now. What shall replace them in the future? Already processes have been devised for fixing the nitrogen of the atmosphere and rendering it available for plant food. Saltpeter and other nitrates can be and long have been made from waste materials such as old mortar and animal refuse. The phosphatic slags have been mentioned in connection with metallurgical processes. These sources of fertility are important, but greater still is the source found in our municipal sewage. The problem of its salvage has been worked out in some localities, but in the United States the people are only beginning to be aroused to its importance. Enormous masses of material, easily available for fertilizing purposes, now drain into our rivers or directly into the sea. Another question, now under investigation, is the possibility of using our common feldspathic rocks in fine powder, to replace the potassium withdrawn by plants from the soil."